Transportation Asset Management Council
Bridge Committee Meeting Agenda
Wednesday, September 25, 2019 11:00 AM
Horatio Earle Learning Center – Lake Michigan Room
7575 Crowner Drive
Dimondale, Michigan 48821

Meeting Telephone Conference Line: 1-877-873-8018   Access Code: 3327994#

Web Meeting Access Link: http://michigandot.adobeconnect.com/rhmmflbr45l4/

1. **Welcome - Call to Order – Introduction**

2. **Public Comments on Non-Agenda Items**

3. **Additions or Deletions of Agenda Items**

4. **Consent Agenda** *(Action Item)*
   4.1. Approval of the August 21, 2019 Meeting Minutes *(Attachment 1)*
   4.2. TAMC Fall Conference Program Agenda *(Attachment 2)*

5. **Update Items**
   5.1. TAMC Asset Management Plan Template & Policy Update – *Belknap/Colling (Memo – Attachment 3)*
   5.2. TAMC Culvert Pilot Project *(Memo – Attachment 4)*
      5.2.1. Culvert Subgroup Update – *Belknap*
      5.2.2. Incorporating Culvert Data from Other Sources into TAMC IMAP-IRT
      5.2.3. Training and Activities for Michigan Technological University & Center for Shared Solutions FY2020 TAMC Budgets and Work Programs
   5.3. Tabled Items Until October 24, 2019 TAMC Bridge Committee Meeting
      5.3.1. 2019 TAMC Annual Report Update
      5.3.2. Bridge Forecast and Statewide Bridge Investment Strategy

6. **Public Comments**

7. **Member Comments**

8. **Adjournment**

The next TAMC Bridge Committee Meeting is scheduled for 9:30 AM-11:30 AM Thursday, October 24, 2019 at Aeronautics Building, 2nd Floor Commission Room, 2700 Port Lansing Road, Lansing, Michigan

Committee Members: Chair: Rebecca Curtis, MDOT - Vice Chair: Keith Cooper, MDOT
Christopher Bolt, MAC - Al Halbeisen, ACEC - Wayne Harrall, CRA
Brian Vilmont, Subject Matter Expert - Brad Wieferich, MDOT

MINUTES
TRANSPORTATION ASSET MANAGEMENT COUNCIL
BRIDGE COMMITTEE MEETING
August 21, 2019 at 9:30 1.m.
Aeronautics Building, 2nd Floor, Commission Conference Room
2700 Port Lansing Road
Lansing, Michigan

** Frequently Used Acronyms List attached.

<u>**Committee Member:**</u>
Christopher Bolt, MAC   Rebecca Curtis, MDOT – Chair
Al Halbeisen, OHM Advisers   Wayne Harrall, KCRC, via Telephone
Brian Vilmont, Prein & Newhof   Brad Wieferich, MDOT

<u>**Support Staff:**</u>
Niles Annelin, MDOT   Roger Belknap, MDOT
Christopher Gilbertson, MTU, via Telephone   Cheryl Granger, DTMB/CSS
Dave Jennett, MDOT   Bill McEntee, CRA
Gloria Strong, MDOT

<u>**Members Absent:**</u>
Keith Cooper, MDOT – Vice-Chair

<u>**Public Present:**</u>
Angela Kline, JCDOT

1. Welcome - Call-To-Order - Introductions:
The meeting was called-to-order at 9:45 a.m.. Everyone was welcomed to the meeting.

2. Public Comments on Non-Agenda Items:
None

3. Additions or Deletions of Agenda Items:
R. Belknap requested that the Draft 2020 TAMC Culvert Condition Assessment Work Plan be added under 5.1. The Committee approved the addition.

4. Consent Agenda (Action Item):
    4.1. - Approval of the July 25, 2019 Meeting Minutes (Attachment 1)
    The minutes Action Items were reviewed to assure all had been completed; all were
  completed.

    Motion: B. Vilmont made a motion to approve the July 25, 2019 meeting minutes;
    A. Halbeisen seconded the motion. The motion was approved by all members present.

4.2. – TAMC Fall Conference-Save-the-Date: 10/30/2019 – R. Belknap (Attachment 2)

The Fall Conference will be held at the Holiday Inn of Marquette, October 30, 2019, jointly with the CUPPAD/MIC Asset Management Summit in afternoon. Monday, Tuesday, Thursday of that same week the Houghton, Escanaba, Sault Ste. Marie summits will be held. There will be a bridge session the morning of the conference. R. Belknap requested volunteers to speak. B. Wieferich and R. Curtis volunteered that one of them will do the presentation.

5. Update Items:

5.1. – TAMC Asset Management Plan Template Update – C. Gilbertson

The changes requested by the Bridge Committee to the asset management template were made by MTU and approved by the full Council. C. Gilbertson did a review of the revised template with the Bridge Committee. The Committee will revisit the plan at a later date and clarify specific areas, such as the Investment Strategy and Finances areas, located in the Bridge Appendix. The top 123 agencies represent 96% of the bridges and 92% of the federal aid roads. MTU, full Council, and the Bridge Committee like the revised template as presented.

5.2. – Draft Work Program Review for Bridge Committee Goals and Objectives – R. Belknap – Action Item (Attachment 3)

The Bridge Committee reviewed the Goals and Objectives area specific to their committee (pages 13 and 14) of the TAMC 2020 – 2022 Strategic Work Program, minor changes were made. The Committee would like to add to the Goals section and potentially revisit the asset management plan template (add to page 11) to make any minor changes if necessary. The trainings would also need to be modified if any changes were made to assure agencies are adding/correcting any items necessary. It was suggested to reference the data in parenthesis in the IRT as "from ADARS" and/or make an IRT dashboard once the ADARS system becomes more defined.

B. Vilmont stressed the fact that the Bridge Committee may have to request additional TAMC funds to go towards culvert data collections and trainings.

Motion: B. Wieferich made a motion to submit the draft work plan to the full Council for their review and approval; C. Bolt seconded the motion. The motion was approved by all members present.

5.3. – Bridge Forecast and Statewide Bridge Investment Strategy – R. Curtis

The full Council requested at the June Strategic Planning Session that a statewide strategy forecasting mix-of-fixes and funding analysis for roads and bridges. R. Curtis is using the Local Bridge Program for predicting condition. The goal of the Bridge Committee is to acknowledge how many critical bridges there are in Michigan and what it actually takes to get the bridges to good/fair. They are looking to get zero serious/critical bridges by 2025. They will look at the current funding strategy vs. needed funding strategy. It is

TAMC's charge to bring to attention the true dollar amount that is required to keep Michigan roads and bridges safe and in good repair. The Committee decided to be consistent with the Bridge Bundling program goal which is 95% good/fair MDOT and 95% good/fair Local. The Bridge committee needs to provide this information to the full Council in November therefore, they added an October 24, 2019 (9:30 a.m.) Bridge Committee meeting to review and finalize their analysis.

Action Item: R. Curtis will finalize her bridge forecasting analysis and share with the Bridge Committee for review and approval at the October 24, 2019 Bridge Committee meeting.

5.4. – TAMC Culvert Pilot Project – R. Curtis/C. Gilbertson (Memo/Attachment 4)
    5.4.1. - Culvert Subgroup Update
    5.4.2. - Incorporating Culvert Data from Other Sources into TAMC IMAP-IRT (Attachment 4)
    5.4.3. - Training and Activities for Michigan Technological University and Center for Shared Solutions FY 2020 TAMC Budgets and Work Programs
Due to a lack of time, the MTU Draft 2020 TAMC Culvert Condition Assessment Work Plan was very briefly reviewed and discussed. D. Jennett quickly reviewed an IRT projects summary report.

Motion: C. Bolt made a motion that the Bridge Committee approve the Draft 2020 Transportation Asset Management Council Culvert Condition Assessment Work Plan so MTU can continue to forward culvert efforts; W. Harrall seconded the motion. The motion was approved by all members present.

Action Item: The MTU Draft 2020 TAMC Culvert Condition Assessment Work Plan needs to be added to the full TAMC 2020-2022 Strategic Work Program for full Council approval at the September 4, 2019 meeting.

Action Item: D. Jennett will give R. Curtis 2-4 years of good bridge data from the IRT.

5.5. – 2019 TAMC Road and Bridges Annual Report Update – D. Jennett
This item was tabled until the next meeting in September.

6. Public Comments:
None

7. Member Comments:
C. Bolt introduced A. Kline, JCDOT's Director of Engineer, to the Committee. She was welcomed to the meeting.

8. Adjournment:
B. Vilmont made a motion to adjourn the meeting at 11:42 a.m.; C. Bolt seconded the motion. The motion was approved by all members present. The next meeting will be held September 25, 2019, at 11:00 a.m.-1:00P.M., MDOT Horatio Earle Learning Center, 7575

Crowner Drive, Dimondale, Michigan 48821. This will be a working luncheon meeting and lunch will be served.

TAMC FREQUENTLY USED ACRONYMS:	
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
ACE	ADMINISTRATION, COMMUNICATION, AND EDUCATION (TAMC COMMITTEE)
ACT-51	PUBLIC ACT 51 OF 1951-DEFINITION: A CLASSIFICATION SYTEM DESIGNED TO DISTRIBUTE MICHIGAN'S ACT 51 FUNDS. A ROADWAY MUST BE CLASSIFIED ON THE ACT 51 LIST TO RECEIVE STATE MONEY.
ADA	AMERICANS WITH DISABILITIES ACT
ADARS	ACT 51 DISTRIBUTION AND REPORTING SYSTEM
BTP	BUREAU OF TRANSPORTATION PLANNING (MDOT)
CFM	COUNCIL ON FUTURE MOBILITY
CPM	CAPITAL PREVENTATIVE MAINTENANCE
CRA	COUNTY ROAD ASSOCIATION (OF MICHIGAN)
CSD	CONTRACT SERVICES DIVISION (MDOT)
CSS	CENTER FOR SHARED SOLUTIONS
DI	DISTRESS INDEX
ESC	EXTENDED SERVICE CONTRACT
FAST	FIXING AMERICA'S SURFACE TRANSPORTATION ACT
FHWA	FEDERAL HIGHWAY ADMINISTRATION
FOD	FINANCIAL OPERATIONS DIVISION (MDOT)
FY	FISCAL YEAR
GLS REGION V	GENESEE-LAPEER-SHIAWASSEE REGION V PLANNING AND DEVELOPMENT COMMISSION
GVMC	GRAND VALLEY METRO COUNCIL
HPMS	HIGHWAY PERFORMANCE MONITORING SYSTEM
IBR	INVENTORY BASED RATING
IRI	INTERNATIONAL ROUGHNESS INDEX

IRT	INVESTMENT REPORTING TOOL
KATS	KALAMAZOO AREA TRANSPORTATION STUDY
KCRC	KENT COUNTY ROAD COMMISSION
LDC	LAPTOP DATA COLLECTORS
LTAP	LOCAL TECHNICAL ASSISTANCE PROGRAM
MAC	MICHIGAN ASSOCIATION OF COUNTIES
MAP-21	MOVING AHEAD FOR PROGRESS IN THE 21ST CENTURY (ACT)
MAR	MICHIGAN ASSOCIATION OF REGIONS
MDOT	MICHIGAN DEPARTMENT OF TRANSPORTATION
MDTMB	MICHIGAN DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
MIC	MICHIGAN INFRASTRUCTURE COMMISSION
MITA	MICHIGAN INFRASTRUCTURE AND TRANSPORTATION ASSOCIATION
MML	MICHIGAN MUNICIPAL LEAGUE
MPO	METROPOLITAN PLANNING ORGANIZATION
MTA	MICHIGAN TOWNSHIPS ASSOCIATION
MTF	MICHIGAN TRANSPORTATION FUNDS
MTPA	MICHIGAN TRANSPORTATION PLANNING ASSOCIATION
MTU	MICHIGAN TECHNOLOGICAL UNIVERSITY
NBI	NATIONAL BRIDGE INVENTORY
NBIS	NATIONAL BRIDGE INSPECTION STANDARDS
NFA	NON-FEDERAL AID
NFC	NATIONAL FUNCTIONAL CLASSIFICATION
NHS	NATIONAL HIGHWAY SYSTEM
PASER	PAVEMENT SURFACE EVALUATION AND RATING
PNFA	PAVED NON-FEDERAL AID
PWA	PUBLIC WORKS ASSOCIATION
QA/QC	QUALITY ASSURANCE/QUALITY CONTROL

RBI	ROAD BASED INVENTORY
RCKC	ROAD COMMISSION OF KALAMAZOO COUNTY
ROW	RIGHT-OF-WAY
RPA	REGIONAL PLANNING AGENCY
RPO	REGIONAL PLANNING ORGANIZATION
SEMCOG	SOUTHEAST MICHIGAN COUNCIL OF GOVERNMENTS
STC	STATE TRANSPORTATION COMMISSION
STP	STATE TRANSPORTATION PROGRAM
TAMC	TRANSPORTATION ASSET MANAGEMENT COUNCIL
TAMCSD	TRANSPORTATION ASSET MANAGEMENT COUNCIL SUPPORT DIVISION
TAMP	TRANSPORTATION ASSET MANAGEMENT PLAN
TPM	TRANSPORTATION PERFORMANCE MEASURES
UWP	UNIFIED WORK PROGRAM

2019 Fall Transportation Asset Management Conference

SPONSORED BY **TAMC** — Michigan Transportation Asset Management Council

CRA County Road Association OF MICHIGAN | MAC | MAR | MDOT Michigan Department of Transportation | michigan municipal league | MTA | MTPA

Visit us on the web at *www.Michigan.gov/TAMC*

The Transportation Asset Management Council (TAMC) is holding a Fall Transportation Asset Management Conference at the Holiday Inn of Marquette, 1951 US-41, Marquette, MI, 49855 on Wednesday, October 30.

TAMC is proud to coordinate the Fall Conference prior to the Central Upper Peninsula Planning and Development (CUPPAD) Marquette Regional Asset Management Summit, which will relate to all types of infrastructure, including transportation. The Regional Asset Management Summits are free events however, TAMC Fall Conference guests will also need to register for the Marquette Regional Asset Management Summit by calling CUPPAD at 906-786-9234 or online using the following link: www.surveymonkey.com/r/J6NSPFY. Walk-in registrations are also welcome for both events.

Hotel Accommodations:
Hotel accommodations can be made with the Holiday Inn of Marquette at 906-225-1351. When booking, use code "TAM" to get the special TAMC Fall Conference room rate of $85.

Registration:
Registration costs for public agencies are $65, and $100 for consultants-private agencies. To register, please call the Center for Technology & Training at 906-487-2102 or go online at: *http://ctt.nonprofitsoapbox.com/2019tamconference-fall*.

SILVER SPONSORS

HNTB

MTPA Michigan Transportation Planning Association

Center for **Technology & Training**
Michigan Technological University • Department of Civil & Environmental Engineering

BRONZE SPONSORS

CRA County Road Association OF MICHIGAN

MAR MICHIGAN ASSOCIATION OF REALTORS

2019 Fall Transportation Asset Management Conference

SPONSORED BY TAMC — Michigan Transportation Asset Management Council

CRA County Road Association of Michigan   MAC   MAR   MDOT Michigan Department of Transportation   michigan municipal league   MTA   MTPA

Visit us on the web at **www.michigan.gov/tamc**

ASSET MANAGEMENT: SETTING THE PACE FOR EVERY DAY
Wednesday, October 30, 2019 – Marquette, Michigan

7:30 AM: **Registration and Breakfast**

8:00 AM: **Welcome and Opening Comments & Brief TAMC Update**
– *Joanna Johnson, TAMC Chair and Road Commission of Kalamazoo County Managing Director*

8:20 AM: **Reporting of 2018 Michigan Road Conditions and Forecast**
– *Jim Ashman, Supervisor, Systems Evaluation and Program Development Unit, MDOT*

9:00 AM: **Reporting of 2018 Michigan Bridge Conditions and Forecast**
– *Rebecca Curtis, TAMC Bridge Committee Chair and MDOT Deputy Chief Bridge Engineer;*
Brad Wieferich, TAMC and MDOT Bureau of Development Director

9:45 AM: **Networking Break**

10:00 AM: **Asset Management Plans & TAMC's Response to
Public Act 325 of 2018: Update on Policy, Procedures and Templates**
– *Gloria Strong and Roger Belknap, TAMC Support Staff, MDOT*

10:30 AM: **Investment Reporting & TAMC's Response to Public Act 199 of 2007: Learning from the Data**
– *Dave Jennett and Roger Belknap, TAMC Support Staff, MDOT*

11:00 AM: **2018, A Year of TAMC Studies: Treatment Costs & Life Cycle Performance Using IRT Data**
– *Center for Technology and Training, Michigan Technological University*

11:45 AM: **Lunch**

12:45 PM: **Father's Day Flood 2018: Infrastructure First Responders & Asset Management Considerations**
– *Eric Waara, City Manager, City of Houghton;*
Kevin Harju, Engineer Manager and John Cima, Assistant Engineer, Houghton County Road Commission;
Robert Tervo, Manager, MDOT Ishpeming Transportation Service Center;
Bruce Kadzban, Engineering Manager, MDOT Local Agency Programs

2:00 PM: **Networking Break**

2:15 PM: **Marquette Regional Asset Management Summit**
Following the TAMC Fall Asset Management Conference the Regional Asset Management Summit will be a fast-paced mix of presentations, interactive problem-solving and facilitated discussion; topics include:
- *Update on the Water and Transportation Asset Management Plans*
- *Using Technology to Facilitate Project Coordination*
- *Introduction to Asset Management Readiness Assessment Resources for your Agency*

Regional Asset Management Summits will be held in Michigan's Upper Peninsula during the week of October 28-31:

Houghton: Monday, October 28   **Escanaba: Tuesday, October 29**
Marquette: Wednesday, October 30   **Sault Ste. Marie: Thursday, October 31**

For more information about the Regional Asset Management Summits, please visit: *www.Michigan.gov/MIC*

Memo

To:	TAMC Bridge Committee
From:	Roger Belknap, TAMC Coordinator
Date:	September 20, 2019
Re:	TAMC Asset Management Plan Template, Policy and Training

Background

There are four main components to TAMC initiatives related to the new Transportation Asset Management Plan (TAMP) requirements per Public Act (PA) 325.

1. TAMP Template - PA 325 modifies TAMC's program to include requirements for asset management plans from local road agencies, as well as develop TAMP template that contain guidance on the required elements specified in the public act. No later than October 1, 2019, the TAMC shall develop a template for an asset management plan as well as establish a schedule of due dates of these plans for agencies that certify 100 miles of road or more. Michigan Tech University's Center for Technology and Training (MTU-CTT) will outline the lasts efforts on the TAMC TAMP template at the September 25 TAMC Bridge Committee meeting.

2. TAMP Policy - TAMC has taken action to identify the schedule of due dates of these plans as communicated in the letter to Public Act 51 agencies on November 20, 2018. In addition, TAMC has approved the Policy for the Submittal and Review of Asset Management Plans for Roads, Bridges and Transportation Infrastructure Pursuant to Public Act 325 of 2018 and Public Act 338 of 2006. This policy provides direction to TAMC, support staff and contractors of TAMC and local agencies that have TAMP requirements. The policy clarifies the elements required, methodology of submittal and procedures of review and certification as well as communication steps along the process.

3. TAMC Investment Reporting Tool (IRT) – The TAMP Policy outlined above identifies the TAMC IRT application as the conduit by which agencies submit their TAMP documents to TAMC. The IRT will have enhancements for the submittal and compliance procedures that assist in the communication methodology of these TAMP submittals. Support Staff will provide the Bridge Committee with a demonstration of these enhancements at the September 25 TAMC Bridge Committee Meeting.

4. TAMC TAMP Training – PA 325 of 2018 also includes the requirement that training on the TAMP Template will be established by TAMC. MTU-CTT has identified a series of webinars and workshops to be announced alongside the TAMP Template release. TAMC will assist in the deployment of these trainings. More specificity of these efforts will be shared at the September 25 TAMC Bridge Committee Meeting.

Attachments with Agenda Packet Attachment 3 is the Policy for the Submittal and Review of Asset Management Plans that has been approved by TAMC on September 4, 2019.

Policy for the Submittal and Review of Asset Management Plans for Roads, Bridges and Transportation Infrastructure Pursuant to Public Act 325 of 2018 & PA 338 of 2006

The Transportation Asset Management Council adopted this policy on September 4, 2019.

Introduction:

The Transportation Asset Management Council (TAMC) was established to expand the practice of asset management statewide to enhance the productivity of investing in Michigan's roads and bridges. Recent amendments to Public Act 51 have outlined additional responsibilities for TAMC to develop a template and a schedule for the submittal of asset management plans from road-owning agencies. This document describes the policy, submission procedures and required elements for these asset management plans as well as role of TAMC and the Michigan Department of Transportation (MDOT) to receive, review and determine compliance with the public act.

Asset Management Planning for Agencies Not Subject to PA 325 Requirements:

PA 325 amended Public Act 51 of 1951 to require road agencies responsible for 100 or more certified centerline mile of public roads to submit asset management plans to TAMC. Agencies that certify less than 100 miles of roads do not have asset management plan submittal requirements under this PA 325 requirement. The Michigan Department of Transportation (MDOT) is not subject to the asset management plan submittal requirement as the Federal Highway Administration provides oversight of asset management plans coming from state transportation departments. TAMC does encourage all road agencies regardless of size to utilize asset management training programs, the TAMC Asset Management Plan Template and processes to assist in management of public road systems and transportation assets. Cities and Villages that are not required to submit asset management plans in response to Public Act 325 of 2018, but that choose to do so in order to shift funding in accordance with MCL 247.663 (Public Act 338 of 2006) shall follow the same procedures for plan submittal and will receive the same review and notification.

Submission of Asset Management Plans to TAMC:

As directed in Public Act 325 of 2018, no later than October 1, 2019, the TAMC shall develop a schedule for due dates of asset management plans by local road agencies responsible for 100 or more certified miles of roads and require its submission to the TAMC.

In 2007, TAMC created the Investment Reporting Tool (IRT) for road agencies to submit road and bridge project information for past and future reporting. In 2017, the IRT was enhanced to allow online submittal of asset management plans and other condition data.

Agencies required to submit asset management plans to remain in compliance with the new law are required to directly submit or coordinate submittal of their asset management plan files using the IRT. The IRT will provide acknowledgement of receipt for files submitted through electronic email sent to the address of the IRT account from which the files were uploaded. TAMC Support Staff will also receive electronic email notification of asset management plan submittals into the IRT from road agencies.

Asset Management Plan Template:
As directed in Public Act 325 of 2018, no later than October 1, 2019, the TAMC shall develop a template for an asset management plan for use by local road agencies responsible for 100 or more certified miles of road and required to submit reports to the TAMC. The TAMC will provide public, digital access to the asset management plan template by making it available for download on the TAMC website; TAMC will also provide for direct distribution of the template through electronic email upon request. TAMC will also provide training and workshops as part of the TAMC Work Program to assist agencies with the creation of their asset management plans.

Asset Management Plan Elements:
The TAMC Asset Management Plan Template outlined above will contain all seven elements required of asset management plans as outlined in Public Act 325 of 2018. The basis of review by TAMC and certification of submitted plans for compliance to this act are the following elements and a defined multi-year capital program; guidance on these elements is provided in italics:

(a) Asset inventory, including the location, material, size, and condition of the assets, in a format that allows for and encourages digital mapping. All standards and protocols for assets shall be consistent with government accounting standards. Standards and protocols for assets that are eligible for federal aid shall be consistent with federal requirements and regulations.

Specific transportation assets included in this inventory, at a minimum, will include roadway surfaces on the County Primary and City Major system and all bridge structures. Until TAMC develops guidance on traffic signals and culverts at a statewide level, road agencies are only required to include a short description of the current status of these two assets within the agency. The TAMC Asset Management Plan Template will include a placeholder section for these asset classes; agencies with inventories and condition data on these and other asset classes are encouraged to incorporate these into their asset management plan.

"Inventory" and "location": These requirements are currently met since the entire public road system is on the framework base map, and all public bridges are located in the MI Bridge system.

"Format that allows digital mapping": Local road agencies using Geographic Information Systems (GIS) must be able to translate location data in their GIS system to the current Michigan framework base map. Limited extent (less than ten) assets that are not kept in a GIS system should be located using the "on/from" system using framework base map road and intersection names.

"Material, size and condition": Currently the TAMC requires this data to be updated for 50% of the federal aid eligible roads, each year using the Pavement Surfaced Evaluation and Rating (PASER) and Inventory Based Rating (IBR) systems. Bridges are as required by federal inspection requirements. This data should also be collected for non-federal aid eligible roads, but there is no minimum requirement.

(b) Performance goals, including the desired condition and performance of the assets, which shall be set by the local road agency. Performance goals may vary among asset classes under the local road agency's jurisdiction. If a local road agency has jurisdiction over roads or bridges that are designated as part of the federal National Highway System, performance goals for that portion of the system shall be consistent with established federal performance targets.

"Performance goals": It is suggested that these goals be set relative to a condition state that the public can understand. For example: Agency will maintain overall paved road conditions at or

better than their 2017 condition of XX% Good and Fair roads. Goals are aspirational, but yet achievable and should be set as such.

"National Highway System (NHS) performance goals": The Michigan Department of Transportation (MDOT) sets statewide performance targets for the NHS system in Michigan. Metropolitan Planning Organizations then have the option of adopting the statewide targets or committing to a quantifiable target for their area. If an MPO adopts the statewide target, they agree to plan and program projects that contribute toward the accomplishment of the statewide performance targets. Local road agency owners of the NHS system, while not required to meet this state wide goal on the individual parts of the NHS that they own, are expected to plan and program projects that will contribute to meeting state goals. As such, the locally owned NHS system should be maintained in a condition that is as good or better than the rest of the federal aid eligible road system within in each local agency as illustrated by comparative PASER ratings..

(c) <u>Risk of failure analysis</u>, including the identification of the probability and criticality of a failure of the most critical assets and any contingency plans.

"Risk of failure": At a minimum, a local road agency will identify the critical linkages in their system that, if not functioning, will cause disruptions to the road users. Critical linkages could include roads or bridges, regardless of condition, that serve either high traffic areas, or link disparate population or industrial centers. Critical linkages could also include assets in poor condition that are likely to cause disruptions or risks to road users.

(d) <u>Anticipated revenues and expenses</u>, including a description of all revenue sources and anticipated receipts for the period covered by the asset management plan and expected infrastructure repair and replacement expenditures, including planned improvements and capital reconstruction.

"Revenues and expenses": This is not intended to be a detailed financial report, but rather a high level assessment of agency funding. Reporting expenses via the Act 51 Distribution and Reporting System (ADARS) system meets this requirement. As with MCL 247.668j (c) A financial performance dashboard that contains information on revenues, expenditures, and unfunded liabilities. Local road agencies may link to financial information provided by the TAMC.

"Infrastructure repair and replacement expenditures": This requirement is met by complying with the TAMC existing investment reporting requirement.

(e) <u>Performance outcomes</u>, including a determination of how the local road agency's investment strategy will achieve the desired levels of service and performance goals and the steps necessary to ensure asset conditions meet or achieve stated goals and a description and explanation of any gap between achievable condition and performance through the investment strategy and desired goals.

"Performance outcomes": Performance outcomes are the anticipated condition of the asset as a whole from five to ten years in the future, using a quantitatively based prediction method. Prediction methods can include modeling by pavement management software, historical trends, or service cycle based methods such as the National Center for Pavement Preservation network quick check.

(f) <u>A description of any plans of the asset owner to coordinate with other entities</u>, including neighboring jurisdictions and utilities, to minimize duplication of effort regarding infrastructure preservation and maintenance.

3

> *"plans of the asset owner to coordinate with other entities": At a minimum, this should include a narrative describing the process for publicly announcing planned projects, and coordinating with agencies responsible for other transportation services or other infrastructure, including buried infrastructure both public and private.*

(g) <u>Proof of acceptance</u>, certification, or adoption by the local road agency's governing body.

> *"Proof of acceptance": At a minimum a board or council approved action to accept the asset management plan. This can be in the form of minutes or resolution.*

(h) <u>Multi-year Program</u>, Asset Management Plans will also contain a multi-year program containing road and bridge projects. The projects contained in multiyear program shall be consistent with the asset management process and asset management plan of that local road agency and shall be reported consistent with categories established by TAMC. This includes annual reporting with TAMC's Investment Reporting Tool (IRT), ensuring identified projects in the multi-year program are included with estimated costs, scope and dates of planned activities.

> *Projects that are planned for future years will meet the general intent of the strategy outlined by the plan. For example: a local road agency cannot detail a strategy to accomplish its goals using a mix of preventive maintenance and reconstruction, then propose only reconstruction projects for three years without some justification for this action.*

Schedule for Asset Management Plan Submissions:

In November 2018, TAMC established a schedule for the submission of asset management plans by local road agencies that ensures that 1/3 of these local road agencies submit an asset management plan each year. Local road agencies may submit plans in earlier years, however they may not delay to a later year.

This schedule is as follows:

	October 1, 2020		October 1, 2021		October 1, 2022
1	Alger County	1	Alcona County	1	Allegan County
2	Baraga County	2	Alpena County	2	Antrim County
3	Bay County	3	Arenac County	3	Barry County
4	Berrien County	4	Benzie County	4	Branch County
5	Calhoun County	5	Charlevoix County	5	Cass County
6	Cheboygan County	6	City Garden City	6	Chippewa County
7	City of Ann Arbor	7	City of Battle Creek	7	City of Bay City
8	City of Dearborn Heights	8	City of Burton	8	City of Flint
9	City of Farmington Hills	9	City of Dearborn	9	City of Holland
10	City of Grand Rapids	10	City of Detroit	10	City of Lincoln Park
11	City of Jackson	11	City of Kalamazoo	11	City of Midland
12	City of Kentwood	12	City of Port Huron	12	City of Muskegon
13	City of Lansing	13	City of Rochester Hills	13	City of Novi
14	City of Livonia	14	City of Roseville	14	City of Pontiac
15	City of Norton Shores	15	City of Saginaw	15	City of Sterling Heights
16	City of Portage	16	City of St. Clair Shores	16	City of Warren
17	City of Romulus	17	City of Taylor	17	City of Westland
18	City of Royal Oak	18	Clare County	18	Crawford County

19	City of Southfield	19	Emmet County	19	Delta County
20	City of Troy	20	Gogebic County	20	Eaton County
21	City of Walker	21	Gratiot County	21	Gladwin County
22	City of Wyoming	22	Houghton County	22	Grand Traverse County
23	Clinton County	23	Ionia County	23	Ingham County
24	Dickinson County	24	Isabella County	24	Iron County
25	Genesee County	25	Kent County	25	Jackson County
26	Hillsdale County	26	Lake County	26	Kalkaska County
27	Huron County	27	Leelanau County	27	Keweenaw County
28	Iosco County	28	Livingston County	28	Lapeer County
29	Kalamazoo County	29	Mackinac County	29	Luce County
30	Lenawee County	30	Marquette County	30	Manistee County
31	Macomb County	31	Menominee County	31	Mecosta County
32	Mason County	32	Missaukee County	32	Montcalm County
33	Midland County	33	Montmorency County	33	Ogemaw County
34	Monroe County	34	Newaygo County	34	Oscoda County
35	Muskegon County	35	Oakland County	35	Presque Isle County
36	Oceana County	36	Ontonagon County	36	Roscommon County
37	Osceola County	37	Otsego County	37	Saginaw County
38	Ottawa County	38	Shiawassee County	38	Schoolcraft County
39	Sanilac County	39	Van Buren County	39	St. Clair County
40	St. Joseph County	40	Washtenaw County	40	Tuscola County
41	Wayne County	41	Wexford County		

Compliance Review Asset Management Plans:
As an element of ongoing compliance reviews for Public Act 51, MDOT and TAMC Support Staff will review asset management plans submitted through the IRT for completion against the asset management plan elements as outlined in Public Act 325 of 2018 and in this policy. Asset management plans that meet these required elements will be approved and notification will be provided to MDOT's Act 51 staff.

Asset management plans submitted that do not meet required elements as outlined in this policy and Public Act 325 of 2018 will be determined to be out of compliance, and the road agency will receive written notice from MDOT's Act 51 staff with directives on how to revise the asset management plan. Non-compliant agencies will also receive contact information for TAMC Support Staff in this notification. Failure to resolve non-compliance standing with Act 51 reporting requirements can lead to Act 51 funds being withheld until such a time that compliance can be determined.

Progress Towards Asset Management Plan Goals:
Beginning October 1, 2025, if the TAMC determines, and MDOT concurs, that a local road agency has not demonstrated progress toward achieving the condition goals described in its TAMP for its federal-aid eligible county primary road system or city major street system, as applicable, the TAMC shall provide notice to the local road agency of the reasons that it has determined progress is not being made. The local road agency shall provide a plan to become compliant within 6 months after receiving the notification. Guidance for progress as it pertains to this policy is as follows:

"Demonstrated progress toward achieving the condition goals": Goals are aspirational, and local road agencies should be encouraged to set them high, but realistically achievable. Demonstrated progress means that the road agency is making a good faith effort to conform to the conditions of its asset management plan through management and planning.

"Become compliant": This means the local road agency will either reassess its condition goals and strategy in their asset management plan, or develop a strategy of planned, fundable projects that will make progress towards its goals as written.

If you have any questions relating to this policy, please contact:

TAMC Asset Management Coordinator
Michigan Department of Transportation
P.O. Box 30050, 425 W. Ottawa Street
Lansing, MI 48909
(517) 230-8192
www.michigan.gov/tamc

![Michigan Transportation Asset Management Council logo]

Memo

To: TAMC Bridge Committee

From: Roger Belknap, TAMC Coordinator

Date: September 20, 2019

Re: TAMC Culvert Pilot Project

Recommendation for the TAMC Bridge Committee
Continue discussions and provide directives to TAMC MDOT Support Staff and Michigan Technological University's Center for Technology and Training (MTU-CTT) to continue development of culvert asset management initiatives.

Background
There are several areas of consideration for these efforts, including establishing a volunteer committee to help the Bridge Committee guide the process, establishing a list of data elements for inclusion into TAMC's interactive map and dashboards, and a work plan for future years to address training and protocols for asset management plans.

At the April 25, 2019 TAMC Bridge Committee meeting, TAMC MDOT Support staff was assigned a task to contact the Water Asset Management Council (WAMC) and other TAMC Council members to invite interested members to participate with TAMC on establishing culvert data elements and asset management guidance. At present time, staff has confirmed the interest from the following participants and the organizations they represent:

TAMC	WAMC	Regional-Metropolitan Planning Organizations
Bill McEntee	Carrie Cox, Oakland County	Kelly Goward, Macatawa Area Coordinating Council
Gary Mekjian	Evan Pratt, Washtenaw County	Ed Hug, Southeast Michigan Council of Governments

In 2018, the MTU-CTT Activities contract with TAMC was amended to include the funding and additional work items to create the Culvert Mapping Pilot work program. After conversations with MDOT Contract Services staff and MTU-CTT staff, MDOT TAMC Support staff recommended a separate Culvert Activities contract for MTU-CTT for administering training and coordinating culvert asset management activities. A separate contract from the existing TAMC Activities contract was recommended for the ease of accounting and administration.

MTU-CTT submitted a 2020 Work Plan for training and activities that was approved at the August 21, 2019 TAMC Bridge Committee Meeting. This proposal was included as an appendix to the 2020-2022 TAMC Strategic Work Program, which TAMC approved on September 4, 2019. Funds for the MTU-CTT Culvert Work

Plan will be provided out of the fund balance of the 2018 Culvert Mapping Pilot appropriation and not the annual TAMC appropriation out of the Michigan Transportation Fund.

Attachments with Agenda Packet

Attachment 4 includes the previously assembled culvert data elements list from the 2018 Culvert Mapping Pilot as well as the MTU-CTT 2020 Culvert Condition Assessment Work Plan that TAMC approved as part of the TAMC's 2020-2022 Strategic Work Program.

TAMC Culvert Pilot – Data Fields/Elements for TAMC Dashboards & Interactive Maps (DRAFT)

Estimated Local Agency Culvert Condition

SEVERE 8%
POOR 25%
GOOD 27%
FAIR 40%
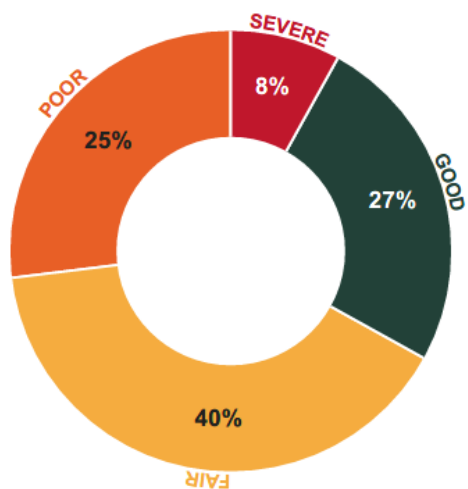
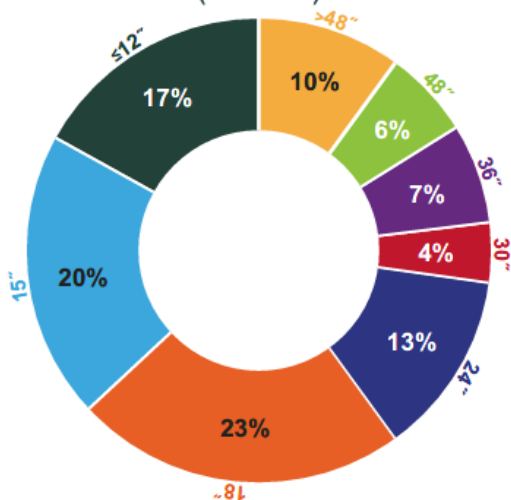Agency Name

Agency Type (County/City/Village)

Culvert ID

Location

Condition Rating (10 Scale Rating)

Summary of Rating
- Good
- Fair
- Poor
- Severe

Reported Culverts by Span or Diameter
(in inches)

>48" 10%
48" 6%
36" 7%
30" 4%
24" 13%
18" 23%
15" 20%
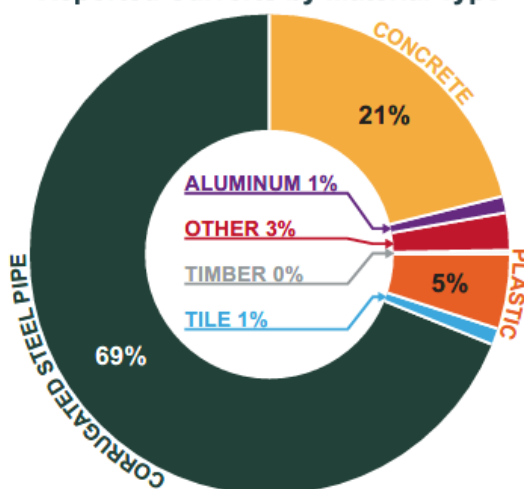≤12" 17%

Agency Name

Agency Type (County/City/Village)

Culvert ID

Location

Summary of Size Categories:
- 24" or less
- > 24"- 48"
- > 48"- 10'
- > 10'- < 20'

Reported Culverts by Material Type

CONCRETE 21%
ALUMINUM 1%
OTHER 3%
TIMBER 0%
TILE 1%
PLASTIC 5%
CORRUGATED STEEL PIPE 69%

Agency Name

Agency Type (County/City/Village)

Culvert ID

Location

Culvert Material Type
- Corrugated Steel
- Concrete
- Plastic
- Other

Proposal Title:

DRAFT 2020 Transportation Asset Management Council Culvert Condition Assessment Work Plan

Submitted To:

Roger Belknap
Bureau of Transportation Planning
Michigan Department of Transportation
belknapr@michigan.gov

Principal Investigator:

Chris Gilbertson PhD, PE
Associate Director
cggilber@mtu.edu
1400 Townsend Drive - 309 Dillman Hall
Houghton, MI 49931
906-487-2102

Co-Principal Investigators:

Tim Colling, PhD, PE
Director – Center for Technology & Training

Contracting Authority:

Kelly Kallio
Director - Sponsored Programs Office
Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931
(906) 487-2226
(906) 487-2245 fax
rsch@mtu.edu

Date Submitted:

August 19, 2019

Michigan Technological University
Civil and Environmental Engineering
1885

Table of Contents

1.0 INTRODUCTION

The Michigan Transportation Asset Management Council (TAMC) began delivering its education program and providing technical services in 2004. Since that time, Michigan Technological University has assisted with the TAMC Education Program and continues to be a logical choice for assisting with this program because of its Center for Technology & Training (CTT). The CTT is part of the Department of Civil and Environmental Engineering (CEE) and is located on Michigan Technological University's campus, which offers a wide array of resources for this project. The CTT houses various state- and federal-funded programs. For example, CTT projects funded by the Michigan Department of Transportation (MDOT) include the Michigan Local Technical Assistance Program (LTAP), Roadsoft, Michigan Engineer's Resource Library (MERL), and Bridge Load Rating technical support program. Additionally, the CTT houses the federally-funded Environmental Protection Agency's Region 5 environmental finance center—the Great Lake Environmental Infrastructure Center (GLEIC). This array of programs economizes upon professional, development, and support staff to make project delivery cost effective and time efficient. The CTT focuses its efforts specifically on projects related to local government agencies and transportation.

One of the prime challenges of effectively working with the over 600 local agencies in Michigan is keeping accurate contact information. The ability of the Michigan LTAP to contact local agency staff through e-mail, phone, and direct mail can provide a major benefit to programs that are targeted at Michigan's local agencies, like TAMC's training efforts. The Michigan LTAP maintains a state-of-the-art contact and event management database, which makes advertising and participant registration for local agency training events a very simple, cost-effective process. In addition, because LTAP is a nationally recognized program working to educate local agencies, events advertised through the Michigan LTAP can take advantage of state and national agreements between partner organizations—such as County Road Association (CRA) of Michigan, National Association of County Engineers (NACE), National Association of Counties (NACO), Michigan Township Association (MTA), American Council of Engineering Companies (ACEC), and Michigan Municipal League (MML)—for access to their contact databases. These agreements allow the Michigan LTAP access to these partner organization mail lists at no cost. Access to these same mail lists outside of LTAP partner organization agreements can have a substantial cost, sometimes as high as $0.10 to $0.20 per contact.

Events that are co-sponsored with the Michigan LTAP benefit by utilizing the wealth of local agency contact information that is stored in the Michigan LTAP contact and event management system and from the no-cost access to Michigan LTAP partner organization mail lists. They also benefit by taking advantage of the infrastructure that the Michigan LTAP has for registering and invoicing participants, event tracking, and training records retention. By not duplicating these

efforts, the arrangement results in an economy of scale through cooperation among programs that educate local agency transportation staff.

Since its inception, the TAMC training program has been and continues to be coordinated as a co-sponsored training event with the Michigan LTAP.

2.0 TAMC WORK PLAN GUIDELINES

At the request of TAMC this proposal has been separated from other project work that CTT has with TAMC in order to get separate and discrete financial information relating to the completion of these tasks.

The tasks for this proposal were identified from educational priorities outlined by TAMC in the Draft TAMC Strategic Work Program for 2020-2022 (See Appendix A).   Tasks are referenced to the appropriate items in the TAMC Strategic Work Program.

3.0 WORK PLAN

This draft work plan is for discussion purposes only to assist TAMC in budgetary planning. It does not represent a firm quote, and it does not commit University personnel, facilities, or funds. Final terms and conditions of this sponsored activity are subject to University review and authorization of a formal proposal or agreement.

This work plan and budget are for the period beginning October 1, 2019 and ending September 30, 2020. The project is approximately $56,000. A more precise and detailed cost estimate will be provided with the final proposal should TAMC accept this scope of work at the budgetary level in Appendix B.

The work plan consists of the following major tasks:

- Task 1: Conduct Culvert Condition Assessment Training
- Task 2: Evaluate Culvert Data from Combined Sources
- Task 3: Culvert Condition Assessment System Translation

A nominal registration fee will be assessed to participants for attending training events delivered under this program consistent with Michigan LTAP policy. Registering and failing to show at an event per Michigan LTAP cancelation policy will result in a fee for participants. Registration fees are calculated to break even for on-site expenses, which include consumables that participants use or take with them (such as facility rental, webinar and phone line

expenses, food and refreshments, handouts, and rental of audio visual equipment). Registration fees help to offset the load on the program for on-site activities. The absence of a registration fee (i.e., free training) has been shown to increase no-shows and decrease attendance at training programs because it is assumed that "free" training has some other profit motive and requires no commitment on the part of the participant.

Participants in training events offered under this program will be issued certificates of completion for continuing education hours (CEH) required for maintaining a Michigan professional engineer license where applicable. Every attempt will be made to ensure that trainings provided in this program are eligible for CEH credit for attendees.

Task 1 – Culvert Data Collection and Condition Assessment Training

Draft TAMC Strategic Work Program for 2020-2022 Item: Bridge Committee Goal 2, Objective 4: Provide Tools and Training for Culvert Data Collection (see Appendix A).

This task includes presentation of five webinar sessions of approximately three-hours each. The training modules will provide detailed information on the three primary aspects of collecting culvert inventory and condition data: equipment, data collection, and data validation.

Two of the webinars will be focused on data collection and data handling. Topics for the training will include: recommended equipment for culvert data collection; completing data collection with Roadsoft using visual walk-throughs of the software to explain the processes needed to collect each piece of information, and the overall process of data management and quality control.

The remaining three webinars will teach participants the technical points of assessing culvert condition using the modified FHWA Culvert Inspection System. The training will present example culverts and allow participants to rate them using the condition assessment system. The training will include at least one example of every major culvert material type along with a variety of culvert conditions. Instructors will provide guidance on the correct use of the condition evaluation system and discuss each example with reference to the culvert rating table provided in the system.

Task 2 – Evaluate Culvert Data from Combined Source

Draft TAMC Strategic Work Program for 2020-2022 Item: Bridge Committee Goal 2, Objective 4: Provide Tools and Training for Culvert Data Collection (see Appendix A).

Regional culvert data is collected and stored locally from a variety of sources throughout the state and there is a desire by the parties collecting data to share this data for their combined

interests. Data is known to exist from the Michigan Department of Natural Resources (MDNR), the Michigan Department of Transportation (MDOT), and the Transportation Asset Management Council (TAMC).

The MDNR facilitated the collection of culvert data from the perspective of gathering information on aquatic habitat in 2013. MDOT gathered culvert data as part of a pilot study in 2016 and 2017. In 2018 TAMC developed a pilot program for the inventory and condition evaluation of local agency culverts. Each of these studies produced data for very specific purposes, some of this data is potentially of use to other agencies and some may not be. This task will study the existing data from the three main sources; MDNR, MDOT, and TAMC, and look at how this data could be combined to create a statewide culvert inventory. Figure 1 shows a comparison between some of the data collected during the TAMC pilot and the MDNR study. While some of the data can be shared (green column) other data is unique to each agency. Each agency also had different data collecting schema, for example condition evaluation through the TAMC pilot looked at several structural elements to determine the overall condition of the culvert on a scale from 1 to 10 whereas a generalized good/fair/poor evaluation was sufficient for the MDNR purposes.

TAMC		MDNR
Inventory ID	Global Inventory ID	Inventory ID
Condition Evaluation (FHWA)	GPS Coordinates	General Condition (good/fair/poor)
Skew Angle	Ownership	Number of Culverts
	Year Inventoried	Inlet Type
	Shape	Outlet Type
	Material Type	Structure Substrate
	Length	Structure Interior
	Width/Height	Percentage Plugged
	Roadway Surface Type	Percentage Crushed
	Depth of Cover	Perched/Not Perched
		Water Depth
		Embedded Depth of Structure
		Water Velocity
		Streem Flow
		Water Depth
		Bankfull Width
		Wetted Width
		Dominant substrate
		Road Condition
		Road Width
		Location of Low Point in Road
		Runoff Path
		Slope
		Vegetation
		Erosion

The largest immediate concern with combining these data sets is the issue of the same (duplicate) culvert appearing in two or more of the datasets since the DNR dataset is not limited by jurisdictional boundaries. Duplicate culverts can be hard to identify simply on spatial

information alone, since the error involved in geographical location data may be as much as 30 feet. Additionally, different standards in precision can also make identifying duplicates difficult.

Duplicate culverts may represent one of three real life scenarios which may or may not be relevant:
1) A single culvert located two times respectively in each system where measurement error makes them appear as separate assets. In this case the duplicate should be removed.
2) A single culvert that has been replaced and exists in one or more systems before and after replacement. In this case the older (removed culvert) data should be removed or marked as deprecated.
3) A multiple barrel culvert where each barrel is located separately. This case may need intervention or a case by case review to determine the appropriate action.

This task will attempt to identify duplicate culverts in each of the datasets based on a comparison of other fields in the inventory, collection date, location data, and any other information present. The final output for this task will be a listing of known duplicates and suspected duplicates in each system. This task will be the first step in developing a state level shared map or dashboard for culverts.

It is likely that the question over whether several sources of data represent the same culvert or multiple culverts will have to be resolved by a site visit. These will be flagged so that a future inspector can resolve the question and assign a global inventory ID at a future date. No site work is planned for this task.

It is expected that this task will help take the first steps at establishing a protocol for sharing culvert data amongst multiple agencies while maintaining individual agency needs, each agency's standards for data collection, and the ability of an agency to update and manage their data with respect to shared data. Concurrently with the completion of this task TAMC and the DNR or other related entities can begin to establish a data sharing protocol in an attempt to answer the following questions for any future incoming data:
- When data comes from multiple sources whose data receives priority?
- Who has the ownership (ability to modify) shared data?
- Have several data sources identified the same culvert or different culverts at the same location?

Task 3 – Culvert Condition Assessment System Translation

Draft TAMC Strategic Work Program for 2020-2022 for the Bridge Committee Goal 2, Objective 5: Incorporate culvert inventory and condition data into TAMC dashboards (see Appendix A).

There are currently two culvert condition assessment systems in use in Michigan. Most local agencies use the modified FHWA Culvert Inspection System used in Roadsoft. MDOT has its own condition assessment system that was developed in house for its own purposes. Both systems appear to meet the need of the respective users, and each group has a significant investment in historical data. Additionally, there is a new rating standard that is currently under development at the federal level through the American Association of State Highway Transportation Officials (AASHTO). Generally speaking, these three systems have the same function, assess similar defects, and have a similar scale direction, however the systems are not identical and therefor pose a problem when displaying data from numerous sources. Regardless of whether TAMC decides to collect data in all or only one of these three system it will need a method for translating culvert condition data to a common scale. This task will develop a translation method for relating data from the MDOT Culvert Assessment System with the Modified FHWA Culvert Inspection System based on inspection of the rating guidance in each element, for each rating level.

The two current rating systems, those used by the TAMC and MDOT for their respective pilots, make use of an elemental approach to break the individual culvert system down into specific elements that are then rated on a numeric scale based on a descriptive list of observable characteristics. These two systems are unique and while they contain some mutual elements they each contain some elements and descriptions not used by the other. It is anticipated that a direct translation from one system to another will not be possible nor would it serve the needs of the respective data owners. However, a comparison of the condition evaluation descriptions for common elements could be used to classify data from both systems into a good/fair/poor/critical system that could be used for making generalized comparisons and to display data on a culvert dashboard. It is not anticipated that a single culvert would be subject to condition evaluation by both MDOT and a local agency so each culvert would continue to be evaluated according to the needs of the culvert owner, however, this process would allow for the creation of state-wide culvert condition dashboards while still providing the culvert owners the specific information needed for their individual asset management plans and decision making.

Two examples are shown below, the Modified FHWA (TAMC) condition evaluation and the MDOT condition evaluation. Comparison of each method shows that a comparison can be made if each individual system is simplified into good/fair/poor/critical descriptions.

Modified FHWA (TAMC)	Excellent	Very Good	Good	Satisfactory	Fair	Poor	Serious	Critical	Imminent Failure	Imminent Failure
	10	9	8	7	6	5	4	3	2	1
Closed Bottom Invert Deterioration	New condition; galvanizing intact; no corrosion.	Discoloration of surface. Galvanizing partially gone along invert. No layers of rust.	Discoloration of surface. Galvanizing gone along invert but no layers of rust. Minor section loss at ends of pipe not located beneath roadway.	Galvanizing gone along invert with layers of rust. Moderate section loss at ends of pipe not located beneath roadway. Moderate section loss: Less than 4% of invert area.	Heavy rust and scale throughout. Heavy section loss with perforations in invert not located under the roadway. Heavy section loss: Up to 10% of invert area.	Extensive heavy rust and scaling throughout. Perforations throughout invert with an area less than 20% of invert area. Overall thin metal, which allows for an easy puncture with chipping hammer.	Extensive heavy rust and scaling throughout. Perforations throughout invert with an area less than 25% of invert area.	Perforations throughout invert with an area greater than 25% of invert area.	Pipe partially collapsed.	Total failure of pipe.
MDOT		Good	Good	Fair	Fair	Poor	Poor	Critical	Critical	Critical
		9	8	7	6	5	4	3	2	1
Invert Deterioration (Metal)		Little or no surface rust or coating loss	Little or no surface rust or coating loss	General corrosion, scaling, or pitting but significant remaining metal section.	General corrosion, scaling, or pitting but significant remaining metal section.	Perforations visible or easily made by hammer test strike	Perforations visible or easily made by hammer test strike	Significant section loss in invert beyond perforations resulting in voids beneath invert and/or roadway/embankment damage.	Significant section loss in invert beyond perforations resulting in voids beneath invert and/or roadway/embankment damage.	Significant section loss in invert beyond perforations resulting in voids beneath invert and/or roadway/embankment damage.

Modified FHWA (TAMC)	Excellent	Very Good	Good	Satisfactory	Fair	Poor	Serious	Critical	Imminent Failure	Imminent Failure
	10	9	8	7	6	5	4	3	2	1
Pipe Joints or Seams	Straight line between sections.	No settlement or misalignment. Tight with no defects apparent.	Minor misalignment at joints. Minor settlement. Distress to pipe material adjacent to joint.	Misalignment of joints but no infiltration. Settlement. Dislocated end section. Extensive areas of shallow deterioration.	Joint open and allowing backfill to infiltrate. Significant cracking or buckling of pipe material. Joint offset less than 3 inches. End sections dislocated and about to drop off from main portion of the structure. Infiltration staining apparent.	Differential movement and separation of joints. Significant infiltration or exfiltration at joints. Joint offset less than 4 inches. Voids seen in fill through offset joints. End sections dropped off at inlet.	Significant openings. Dislocated joints at several locations exposing fill material with joint offsets greater than 4 inches. Infiltration or exfiltration causing misalignment of pipe and settlement or depressions in roadway. Large voids seen in fill through offset joints.	Culvert not functioning due to alignment problems throughout. Large voids seen in fill through offset joints.	Pipe partially collapsed or collapse is imminent.	Total failure of pipe.
MDOT		Good	Good	Fair	Fair	Poor	Poor	Critical	Critical	Critical
		9	8	7	6	5	4	3	2	1
Joints		No gaps	No gaps	Open with minor infil/exfil of water and/or soil	Open with minor infil/exfil of water and/or soil	Open or displaced with significant infil/exfil of soil and water. Voids visible	Open or displaced with significant infil/exfil of soil and water. Voids visible	Open or displaced with significant infiltration of soil with accompanying roadway damage	Open or displaced with significant infiltration of soil with accompanying roadway damage	Open or displaced with significant infiltration of soil with accompanying roadway damage

It should be noted that while the Modified FHWA (TAMC) approach clearly identifies how the condition evaluation of individual elements becomes an overall rating this is not clear for the MDOT system. The algorithm used by MDOT to determine the overall rating would have to be provided or the data comparisons would have to remain at the elemental level.

The final product for this task will be a series of mapping tables from one rating system to the other in Good-Fair-Poor-Critical groupings which will assist in creating a state level culvert inventory with broad condition data.

4.0 KEY PERSONNEL

Chris Gilbertson, PhD, PE, Associate Director – PI
Tim Colling, PhD, PE, Director – Co-PI

Names of Employees and Positions for this Service
Allison Berryman, Customer Svc & Data Support Specialist
Chris Codere, Sr. Project Manager, Training & Operations

Tim Colling, PhD, PE, Director – PI
Mary Crane, Sr. Software Engineer
Cynthia Elder, Workshop Coordinator
Zach Fredin, PE, Research Engineer I
Chris Gilbertson, PhD, PE, Associate Director
Andy Manty, PE, Research Engineer
Victoria Sage, MS, Technical Writer/Training Coordinator
Peter Torola, PE, Research Engineer II

Appendix A: Transportation Asset Management Council 2017-2019 Work Program.

Appendix B: Budget and Cost Derivation MDOT Form 5101A-1

Appendix C: Payroll Verification